CLAIMS

I claim:

1. A wireless sensor system for providing irrigation control, the system comprising:

a plurality of sensor nodes, each sensor node including a wireless transceiver, a processor and a sensor device, the sensor node providing sensor data; and

a plurality of actuator nodes, each actuator node including a wireless transceiver, a processor and an actuating circuit for driving at least one irrigation valve, the actuator node generating control commands;

wherein a first sensor node of the plurality of sensor nodes communicates a first message to a first actuator node of the plurality of actuator nodes through wireless communication, the first message comprising sensor data or control commands, and the first actuator node controls the at least one irrigation valve based on the first message.

2. The system of claim 1, wherein the first sensor node communicates the first message to the first actuator node through one or more wireless nodes in the system, the wireless nodes being one or more of the plurality of sensor nodes or one or more of the plurality of actuator nodes.

3. The system of claim 2, wherein the plurality of sensor nodes and the plurality of actuator nodes are distributed to support a first irrigation zone and a second irrigation zone.

4. The system of claim 3, wherein the first sensor node supports the first irrigation zone and at least one wireless node

of the one or more wireless nodes supports the second irrigation zone.

5. The system of claim 1, wherein the first sensor node generates a control command based on the sensor data and transmits the control command to the first actuator node through wireless communication.

6. The system of claim 1, wherein the first sensor node generates sensor data and transmits the sensor data to the first actuator node through wireless communication.

7. The system of claim 6, wherein the first sensor node transmits sensor data to the first actuator node in response to a request from the first actuator node.

8. The system of claim 1, wherein the first actuator node controls the on-duration of the irrigation valve based on the sensor data.

9. The system of claim 1, wherein the first actuator node receives sensor data from the first sensor node and a second sensor node of the plurality of sensor nodes, the first actuator node controlling the irrigation valve based on sensor data received from the first and second sensor nodes.

10. The system of claim 1, wherein the sensor device of each of the plurality of sensor nodes comprises one of a soil moisture sensor, a temperature sensor, a relative humidity sensor, a light level sensor, or a dissolved oxygen sensor.

11. The system of claim 1, wherein each of the plurality of sensor nodes and each of the plurality of actuator nodes further comprises a power unit.

12. The system of claim 11, wherein the power unit comprises one of a solar power device or a battery power device.

13. The system of claim 12, wherein the power level of the solar or battery power device is measured to determine if a power failure condition has occurred.

14. The system of claim 1, further comprising:

a wireless monitor node including a wireless transceiver, the wireless monitor node monitoring sensor data from the plurality of sensor nodes.

15. The system of claim 1, further comprising:

a wireless gateway node including a wireless transceiver, the wireless gateway node monitoring data from the plurality of sensor nodes and the plurality of actuator nodes and communicating the data to a network gateway.

16. The system of claim 1, further comprising:

a wireless repeater node including a wireless transceiver, the wireless repeater node receiving a message from one of the plurality of sensor nodes and the plurality of actuator nodes and transmitting the message to a destination sensor or actuator node.

17. The system of claim 16, wherein the first sensor node communicates the first message to the first actuator node through the wireless repeater node.

18. The system of claim 1, wherein the wireless transceivers of the sensor nodes and the actuator nodes communicate using radio frequency (RF) and the relative position of the plurality of sensor nodes and the plurality of actuator nodes is determined by measuring the RF power of a received signal and triangulating the measured RF power from two or more sensor or actuator nodes.

19. A wireless sensor system for providing irrigation control, the system comprising:

a plurality of wireless nodes, each wireless node including a wireless transceiver, a processor and a device component, the plurality of wireless nodes comprises a first group and a second group of wireless nodes;

the first group of the plurality of wireless nodes comprising a plurality of sensor nodes, each sensor node including a sensor device as the device component, the sensor node providing sensor data; and

the second group of the plurality of wireless nodes comprising a plurality of actuator nodes, each actuator node including an actuating circuit as the device component for driving at least one irrigation valve, the actuator node generating control commands;

wherein a first wireless node of the plurality of wireless nodes communicates a first message to a second wireless node of the plurality of wireless nodes through wireless communication, the first message comprising sensor data or control commands.

20. The system of claim 19, wherein the second wireless node comprises an actuator node, the actuator node controlling the at least one irrigation valve based on the first message.

21. The system of claim 19, wherein the first wireless node communicates the first message to second wireless node through one or more wireless nodes of the plurality of wireless nodes.

22. The system of claim 19, wherein the first wireless node comprises a sensor node generating a control command based on the sensor data, the first wireless node transmitting the control command to the second wireless node.

23. The system of claim 22, wherein the second wireless node comprises an actuator node, the second wireless node receiving the control command from the first wireless node for controlling the at least one irrigation valve.

24. The system of claim 19, wherein the wireless transceivers of the wireless nodes communicate using radio frequency (RF) and the relative position of the plurality of wireless nodes is determined by measuring the RF power of a received signal and triangulating the measured RF power from two or more wireless nodes.